University : **Benha University**
Faculty : **Faculty of Engineering at Shoubra**
Department : **Civil Engineering**
Program on which the course is given: B. Sc. Civil Engineering
Major or minor element of program: Major
Department offering the program: Civil Engineering Department
Department offering the course: Civil Engineering Department

1- Course Data (Basic Information)

Course Code: **CVE 213**
Course Title: **Reinforced concrete 1-A**
Study Year: **Second Year**
Specialization :
Teaching Hours:
Lecture : **2** Tutorial : **2** Practical : **0**
Compulsory or Elective element of program: **Compulsory**

2- Course Aims

The aims of this course are to have enough knowledge on the fundamentals of analysis and design of reinforced concrete sections and to be familiar with the design and safety requirements in Egyptian design code of RC structures.

3- Course Contents (As indicated in the program Below)

Statical systems and load distribution- Cases of loading- Maximum- maximum internal forces- Ultimate limit state design method- Analysis and design of rectangular, T and L-sections under flexure, shear and torsion- Shear friction and RC corbels - Axial force design of RC sections- Eccentric force design of RC sections- Biaxial bending design of RC sections. Design has to be done according to the Egyptian code for design of reinforced concrete structures.

4- Program Competencies Served by the Course (A4 and B2)

Level A Competencies

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

Level B Competencies

B2. Achieve an optimum design of reinforced concrete and steel structures, foundations and earth retaining structures; and at least three of the following civil engineering topics: transportation and traffic, roadways and airports, railways, sanitary works, irrigation, water resources and harbors; or any other emerging field relevant to the discipline.

5- Learning Outcomes (LO's)

At the end of the course, the student will be able to:

Cognitive Domain	
LO1	**Identify the properties of concrete and steel reinforcement.**
LO2	**Classify the external loads and internal forces.**
Psychomotor Domain	
LO3	**Adapt the flexural analysis and design of concrete sections**
LO4	**Use design methods and safety requirements.**
Affective Domain	
LO5	**Demonstrate the properties of concrete as building material.**
LO6	**Integrate full design for all internal forces.**

6- Mapping Learning Outcomes (LO's) with Competencies

LO's / NARS	A4	B2	
Cognitive Domain			
LO1		■	
LO2		■	
Psychomotor Domain			
LO3		■	
LO4	■		
Affective Domain			
LO5	■	■	
LO6	■	■	

7- Lecture Plan

Week No.	Topics	Planned Hours	Learning Outcomes					
			LO1	LO2	LO3	LO4	LO5	LO6
1	**Properties of concrete and steel reinforcement**	4	■				■	
2	**External loads and internal forces**	4		■				
3	**Design methods and safety requirements**	4				■		
4	**Flexural analysis of RC sections 1**	4		■	■		■	■
5	**Flexural analysis of RC sections 2**	4			■		■	■
6	**Flexural design of RC sections 1**	4			■		■	■
7	**Flexural design of RC sections 2**	4			■		■	■
8	**Midterm Exam**	2						
9	**Shear design of RC sections**	4		■	■	■	■	■

10	**Torsion design of RC sections**	4		■	■	■	■	■
11	**Shear friction and RC corbels**	4		■		■	■	■
12	**Axial force design of RC sections**	4		■	■	■	■	■
13	**Eccentric force design of RC sections**	4		■	■	■	■	■
14	**Biaxial bending design of RC sections**	4		■	■	■	■	■
15	**Final Exam**	3						

8) Teaching and Learning Methods

Learning Outcomes		Teaching and Learning Methods									
		Face-to-face Lecture	Online Lectures	Tutorial / Exercise	~~Group Discussions~~	~~Laboratory~~	Self-Reading	~~Presentation~~	~~Collaborate Learning (Team Project)~~	~~Research and Reporting~~	Brain Storming
Cognitive Domain	#1		●	●							●
	#2		●	●							●
Psychomotor Domain	#3			●			●				●
	#4			●			●				●
Affective Domain	#5	●	●	●			●				●
	#6		●	●			●				●

Student Academic Counseling and Support

- **Students are directed to contact teaching staff or academic support during specific office hours.**
- **Regarding this course, Instructor and TA are available two hours a week as indicated in the timetable declared for students from the beginning of the semester.**
- **A what App. group is created where students can ask questions and share files with teaching staff and to announce changes to the timetable, exam days …etc.**
- **There are no disabled students in the programs, so no special support is needed.**

9- Student Assessment

a- Student Assessment Methods

Learning outcomes		Assessment Methods									
		Written Exams	~~Online Exams~~	~~Oral Exam~~	Pop Quizzes	~~In-class Problem Solving~~	~~Take Home Exam~~	Research Assignments	~~Reporting Assignments~~	~~Project Assignments~~	In-class Questions
Cognitive Domain	#1	●			●						●
	#2	●			●						●
Psychomotor Domain	#3	●*						●			●
	#4	●*						●			●
Affective Domain	#5	●			●						
	#6	●			●						

*Traditionally Psychomotor learning outcomes cannot be assesses using written exams, however, the students are asked to put in writing when they are going to perform in the office or on site when they start working as civil engineers in the future.

b- Assessment Schedule and Weight

Assessment Tools	Week	Weight
Midterm Examination	**8**	**20 %**
Final Examination	**(As Scheduled) 15**	**60 %**
Research assignments	**4,7**	**10 %**
Quizzes	**3,9**	**10 %**
Total		**100 %**

10- Facilities

The following facilities are needed for this course:

■ **Classroom**	□ Smart Board	□ Computer with software
■ **Lecture Hall**	■ **White Board**	□ MIS system
■ **Sound and Microphone**	■ **Data Show**	■ **Internet Access (at students homes for self study)**
■ **Other: personal lap top of instructor**		

11- List of References

a- Course Notes

1-**Lectures are sent to all students by email at the start of the semester.**
2- Videos related to the topics of the course are sent to all students by email at the start of the semester.
3- Lectures notes and solved examples.

b- Books

1. **Egyptian code of practice for analysis and design of R.C structures ECP-203 (Print 2017).**
2. **Egyptian code for design aids for RC structures, 2014.**
3. **Egyptian code for standard reinforcement detailing, 2014.**
4. **Design of concrete structures by A.H. Nilson, 2010.**
5. **Reinforced concrete: mechanics and design by J.G. MacGreger, 2012.**

c- Recommended Books

1- Design of reinforced concrete structures- V1 by M. Ghoneim, 2008 .

d- Journals

1- **ACI structural journal, American concrete institute.**
2- **Cement and Concrete Research, Elsevier**
3- **Construction and Building Materials, Elsevier.**
4- **Magazine of Concrete Research, Institution of Civil Engineers.**
5- **Journal of Building Engineers, Elsevier.**
6- **Journal of Structure Engineers ,Elsevier.**

- Course Coordinator: Prof. Ahmed Abd El Fattah Mahmoud **Signature:**

- Program Coordinator: Prof. Nasser Mosleh **Signature**